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Waste Management Facilities
Design Criteria

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DESIGN CRITERIA FOR CLASS I LANDFILL SITES (Hazardous Waste)

These design criteria are intended to limit the areal extent of ground water degradation. The overall guideline for limiting the zone of degradation, however, should be that no contamination will appear above background concentrations at the facility's property boundary, or within the nearest underlying aquifer.

I. General

- A. Siting/zoning authority shall be obtained from local unit of government, pursuant to Section 39 of the Act.
- B. Location requirements per Section 21-K of the Act.
- C. Surface
 - 1. Buffer zone, consisting of a minimum of two to four hundred foot setback from property line to waste boundary.
 - 2. Fence, minimum 6 foot high chain link type with gate for access/security control, at property boundary.
 - 3. No facility shall be located within the 100-year flood plain as indicated by U.S.G.S. Flood Prone Area Map series.
- D. Subsurface

Minimum in the range of five to ten feet vertical distance from bottom of 10' liner (in situ or placed) to seasonal high regional ground water table.
- E. Noise

Mufflers, berms, and other sound shielding devices shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operations, in accordance with Chapter 8: Noise Regulations.
- F. Site Concealment

Facility location and design shall provide for the concealment of the operations from public view.

II. Soils & Geologic Requirements

A. Geology

General description (soils, lithology, depth to water, method of deposition of unconsolidated material) of local (within 2 mile radius of site) geologic setting.

B. Soils

1. Testing

- a. Borings - (conducted in accordance with ASTM:D1452) Minimum 6 borings per the initial 10 acres with 1 additional boring, minimally required, for each additional 5 acres. Borings shall be completed to a minimum 30' below lowest waste boundary (e.g., trench floor) and shall be located in a manner that accurately represents the geologic variations of the site. The Agency reserves the right to require additional borings.

- b. Soil Sampling - Soils samples shall be collected from all borings using continuous sampling intervals thereby securing a complete soil column representative of the stratigraphic variations in each boring. These samples shall be collected in accordance with ASTM:D1586 and/or D1587 and shall be retained for Agency inspection until such time as a Developmental Permit has been granted.

- c. Grain Size Analyses - Minimum one analysis for each boring and each soil type classified in the field in accordance with ASTM:D420 and D2488. All analyses shall be conducted in accordance with ASTM:D421-422, specifically, including Hydrometer Tests, and recorded on Standard Grain Size Analysis Curves. Each sample shall also be plotted on a tri-coordinate graph for soil classification using system described by Shepard in "Nomenclature Based on Sand-Silt Clay Ratios," published in Journal of Sedimentary Petrology, v. 24; p. 151-158.

- d. Ion exchange capacity - Tests shall be performed minimally once per each boring, including a representative of each unconsolidated material type present on site, conducted in accordance with the American Society of Agronomy method, using a one normal solution of NH_4 aqueous at pH 7.0 \pm 0.1.

- e. Atterberg Limits (Liquid Limit, Plastic Limit and Plasticity Index) - Shall be performed minimally once per each auger boring, including a representative of each unconsolidated material type present on site, conducted in accordance with ASTM:D423-424.

- f. Hydraulic conductivity (permeability) - Tests shall be performed minimally once per each boring to include each unconsolidated material found at the site.

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- 1) Applicant shall specify method used.
 - 2) Perform vertical and lateral testing for in-situ soils. For placed and compacted liners, perform tests on soil mix to be used for the liner.
 - 3) Samples shall be obtained by thin-walled (Shelby) tubes (minimum 3 inch diameter).
- g. Specific yield (effective porosity) - Perform tests on liner soils (in-situ or placed, as designed).
 - h. Attenuation mechanisms of the proposed soil liner.
 - i. Structural strength.
2. Soil Study Report
 - a. Test Results - All test results shall be included and certified as to being conducted in accordance with the cited Standard Method.
 - b. All field study work including but not limited to borings, field classification of soils, and documentation of procedures shall be conducted in accordance with ASTM:D420 and D2488 and certified by a qualified geologist or geotechnical engineer.
 - c. Minimum three cross sections (indicating scale and/or any exaggeration used) depicting the stratigraphic relationship of soil (and bedrock, where identified in borings.)
 - d. Discussion of soil structure. (i.e. cementation, fracturing, grain shape, etc.)
 - e. Discussion of soil testing results.
 - f. Discussion of soil utilization (i.e. cover, liner material, etc.)

C. Hydrogeology

1. Data Collection and Testing
 - a. pump tests on permeable units
 - b. water levels at each boring location after boring and at stabilization
 - c. description of water bearing units
 - d. determination of hydraulic head, i.e., gradient, fluctuations

2. Evaluation and Report

- a. Relationship between units, i.e., aquifers vs. aquitards vs. aquiclude
- b. Water balance study (site specific)
- c. Assessment of water quality prior to facility development
- d. Ground water level fluctuation study (site; region)
- e. Evaluate influence of all potential ground water recharge and depletion sources within 1 mile radius, e.g., lagoons, lakes, industrial wells, water supply wells, field tiles, etc.
- f. Description of hydrologic setting of site (present)
- g. Description of paleo-hydrologic setting of site
- h. Piezometric surface maps (present and projected)

3. Water Quality Impact Assessment

- a. Theoretical containment time (1st arrival in wells)
- b. "Worst Case" scenario effects (i.e., liner failure)
- c. Contingency plan for controlling leachate plume(s)

III. Liner Requirements (in situ, or placed & compacted)

- A. Ten foot thick clay soil liner (bottoms and side seals) shall:
 - 1. Exhibit maximum permeability of 1×10^{-8} cm/sec in both horizontal and vertical planes.
 - 2. Demonstrate minimal compaction to 95% Proctor Density in accordance with ASTM:D698.
 - 3. All side seals shall be keyed at least 3 feet into soils of the bottom liner exhibiting maximum permeability of 1×10^{-8} cm/sec.
- B. Berms and liner shall be 2-3 feet higher than the waste level.
- C. An artificial liner that is compatible with the waste to be emplaced and is at least 60 to 100 mil thick shall be placed above the clay liner. Any emplaced liner material must be installed in a manner that will protect the function and physical integrity of the liner.

- D. A leachate detection and collection system shall be installed between the clay liner and artificial liner. The detection system shall be checked quarterly for the presence of leachate. If leachate is present, it shall be sampled and analyzed for the parameters present in the waste. Results shall be submitted to the Agency. Leachate shall be pumped from the collection system and managed.

IV. Cover Material

- A. Suitability - Cover shall be demonstrated to minimally meet the following criteria:

1. Cover shall contain less than 50% (by weight) sand or coarser material (i.e., less than .05 mm as per U.S.D.A.)
2. Cover shall contain more than 5% (by weight) clay (i.e., greater than .0002 mm as per U.S.D.A.)

- B. Cover Source Evaluation - Initial soils balance study shall minimally include the following data:

1. All calculations used to determine amount of cover necessary to facilitate compliance with cover requirements for each operating day, operating year, and the operating life of the site.
2. Calculations of other methodology used to determine total volumes of suitable cover available from all indicated borrow areas.
3. Narrative explaining the basis for the method of calculating those items required above.
4. Evaluations shall be certified by Professional Engineer.

The Agency reserves the right to require any additional data to determine the validity of any evaluation so as to ensure compliance with all regulations of this Chapter and the Act.

- V. Surface water, erosion, and landscape management plan - plan shall minimally include but not be limited to the following data:

- A. Narrative, plan and design addressing Run-on Management, i.e., the prevention of run-on entering fill areas.
- B. Narrative, plan and design addressing Run-off Management, specifically including the management of contaminated run-off.
- C. Narrative, plan and design addressing surface drainage management specifically including management during

development, operation, and after the site is closed. Plan shall be developed in accordance with local soil and water conservation district standards.

- D. Narrative, plan and design of erosion management specifically including management during development, operation, and after the site is closed.
- E. Narrative, plan and design of landscape management specifically including management of vegetation in the buffer zone during development, operation, after the site is closed.

VI. Ground Water Monitoring Program Requirements (Appendix I)

VII. Gas Management System - (Reserved)

VIII. Closure Design Requirements

- A. Final cover shall be a minimum of two feet of cover material (see Section IV A. in this Chapter).
- B. Artificial cap liner shall be installed.
- C. Vegetative cover to protect liner systems and promote drainage without erosion.
- D. Slopes on completed facility shall be no greater than 3 to 1 (horizontal to vertical) and no lesser than 33 to 1 to promote drainage and minimize erosion.

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DESIGN CRITERIA FOR CLASS II LANDFILL SITES (Non-hazardous and General Municipal Waste)

These design criteria are intended to limit the areal extent of ground water degradation. The overall guideline for limiting the zone of degradation, however, should be that no contamination will appear above background concentrations at the facility's property boundary, or within the nearest underlying aquifer.

I. General

A. Siting/zoning authority shall be obtained from local unit of government, pursuant to Section 39 of the Act.

B. Surface

1. Buffer zone, consisting of a minimum two hundred foot setback from property line to waste boundary.
2. Fence, minimum 6 foot high chain link type with gate for access/security control, at property boundary.
3. No facility shall be located within the 100-year flood plain as indicated by U.S.G.S. Flood Prone Area Map series.

C. Subsurface - Minimum five feet vertical distance from bottom of 10' liner (in situ or placed) to seasonal high regional water table.

D. Noise - Mufflers, berms, and other sound shielding devices shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operations, in accordance with Chapter 8: Noise Regulations.

E. Site Concealment - Facility location and design shall provide for the concealment of the operations from public view.

II. Soils and Geologic Requirements

A. Geology - General description (soils, lithology, depth to water, method of deposition of unconsolidated material) of local (within 2 mile radius of site) geologic setting.

B. Soils

1. Testing

- a. Borings - (conducted in accordance with ASTM:D1452) Minimum 6 borings per the initial 10 acres with 1 additional boring, minimally required, for each additional 5 acres. Borings shall be completed to a

minimum 30' below lowest waste boundary (e.g., trench floor) and shall be located in a manner that accurately represents the geologic variations of the site. The Agency reserves the right to require additional borings.

- b. Soil Sampling - Soils samples shall be collected from all borings using continuous sampling intervals thereby securing a complete soil column representative of the stratigraphic variations in each boring. These samples shall be collected in accordance with ASTM:D1586 and/or D1587 and shall be retained for Agency inspection until such time as a Developmental Permit has been granted.
- c. Grain Size Analyses - Minimum one analysis for each boring and each soil type classified in the field in accordance with ASTM:D420 and D2488. All analyses shall be conducted in accordance with ASTM:D421-422, specifically, including Hydrometer Tests, and recorded on Standard Grain Size Analysis Curves. Each sample shall also be plotted on a tri-coordinate graph for soil classification using system described by Shepard in "Nomenclature Based on Sand-Silt Clay Ratios," published in Journal of Sedimentary Petrology, v. 24; p. 151-158.
- d. Ion Exchange Capacity - Tests shall be performed minimally once per each boring, including a representative of each unconsolidated material type present on site, conducted in accordance with the American Society of Agronomy Method, using a one normal solution of NH_4 aqueous at $\text{pH } 7.0 \pm 0.1$.
- e. Atterberg Limits (Liquid Limit, Plastic Limit and Plasticity Index) - Tests shall be performed minimally once per each auger boring, including a representative of each unconsolidated material type present on site, conducted in accordance with ASTM:D423-424.
- f. Hydraulic conductivity (permeability) - Tests shall be performed minimally once per each boring to include each unconsolidated material found at the site.
- 1) Applicant shall specify method used.
 - 2) Perform vertical and lateral testing for in-situ soils. For placed and compacted liners, perform tests on soil mix to be used for the liner.

- 3) Samples shall be obtained by thin-walled (Shelby) tubes (minimum 3 inch diameter)
- g. Specific yield (effective porosity) - Perform tests on liner soils (in-situ or placed, as designated).
 - h. Attenuation mechanisms of the proposed soil liner.
 - i. Structural strength.

2. Soil Study Report

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- a. Test Results - All test results shall be included and certified as to being conducted in accordance with the cited Standard Method.
 - b. All field study work including but not limited to borings, field classification of soils, and documentation of procedures shall be conducted in accordance with ASTM:D420 and D2488 and certified by a qualified geologist or geotechnical engineer.
 - c. Minimum three cross sections (indicating scale and/or any exaggeration used) depicting the stratigraphic relationship of soils (and bedrock, where identified in borings.)
 - d. Discussion of soil structure (i.e. cementation, fracturing, grain shape, etc.)
 - e. Discussion of soil testing results.
 - f. Discussion of soil utilization (i.e. cover, liner material, etc.)

C. Hydrogeology

1. Data Collection and Testing

- a. pump tests on permeable units
- b. water levels at each boring location after boring and at stabilization
- c. description of water bearing units
- d. determination of hydraulic head, i.e., gradient, fluctuations

2. Evaluation and Report

- a. Relationship between units, i.e., aquifers vs. aquitards vs. aquiclude
- b. Water balance study (site specific)

- c. Assessment of water quality prior to facility development
 - d. Ground water level fluctuation study (site; region)
 - e. Evaluate influence of all potential ground water recharge and depletion sources within 1 mile radius, e.g., lagoons, lakes, industrial wells, water supply wells, field tiles, etc.
 - f. Description of hydrologic setting of site (present)
 - g. Description of paleo-hydrologic setting of site
 - h. Piezometric surface maps (present and projected)
3. Water Quality Impact Assessment
- a. Theoretical containment time (1st arrival in wells)
 - b. "Worst Case" scenario effects (i.e., liner failure)
 - c. Contingency plan for controlling leachate plume(s)

III. Liner Requirements (in situ, or placed & compacted)

- A. Ten foot thick clay soil liner (bottoms and side seals) shall:
- 1. Exhibit maximum permeability of 1×10^{-7} cm/sec in both horizontal and vertical planes.
 - 2. Demonstrate minimal compaction to 95% Proctor Density in accordance with ASTM:D698.
 - 3. All side seals shall be keyed at least 3 feet into soils of the bottom liner exhibiting maximum permeability of 1×10^{-7} cm/sec.
- B. Berms and liner shall be 2-3 feet higher than the waste level.
- C. If applicant proposes to accept free liquids:
- 1. An artificial liner that is compatible with the waste to be emplaced and is at least 60 to 100 mil thick shall be placed above the clay liner. Any emplaced liner material must be installed in a manner that will protect the function and physical integrity of the liner.
 - 2. A leachate detection and collection system shall be installed between the clay liner and artificial liner.

The detection system shall be checked quarterly for the presence of leachate. If leachate is present, it shall be sampled and analyzed for the parameters present in the waste. Results shall be submitted to the Agency. Leachate shall be pumped from the collection system and managed.

IV. Cover Material

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- A. Suitability - Cover shall be demonstrated to minimally meet the following criteria:
 - 1. Cover shall contain less than 50% (by weight) sand or coarser material (i.e., less than .05 mm as per U.S.D.A.).
 - 2. Cover shall contain more than 5% (by weight) clay (i.e., greater than .0002 mm as per U.S.D.A.).
 - B. Cover Source Evaluation - Initial soils balance study shall minimally include the following data:
 - 1. All calculations used to determine amount of cover necessary to facilitate compliance with cover requirements for each operating day, operating year, and the operating life of the site.
 - 2. Calculations of other methodology used to determine total volumes of suitable cover available from all indicated borrow areas.
 - 3. Narrative explaining the basis for the method of calculating those items required above.
 - 4. Evaluations shall be certified by Professional Engineer.

The Agency reserves the right to require any additional data to determine the validity of any evaluation so as to ensure compliance with all regulations of this Chapter and the Act.

- V. Surface water, erosion, and landscape management plan - plan shall minimally include but not be limited to the following data:
 - A. Narrative, plan and design addressing Run-on Management, i.e., the prevention of run-on entering fill areas.
 - B. Narrative, plan and design addressing Run-off Management, specifically including the management of contaminated run-off.
 - C. Narrative, plan and design addressing surface drainage management specifically including management during development, operation, and after the site is closed. Plan shall be developed in accordance with local soil and water conservation district standards.

D. Narrative, plan and design of erosion management specifically including management during development, operation, and after the site is closed.

E. Narrative, plan and design of landscape management specifically including management of vegetation in the buffer zone during development, operation, after the site is closed.

VI. Ground Water Monitoring Program Requirements (Appendix II)

VII. Gas Management System - (Reserved)

VIII. Closure Design Requirements

A. Final cover shall be a minimum of two feet of cover material (see Section IV A. in this Chapter).

B. Vegetative cover to protect liner systems and promote drainage without erosion.

C. Slopes on completed facility shall be no greater than 3 to 1 (horizontal to vertical) and no lesser than 33 to 1 to promote drainage and minimize erosion.

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DESIGN CRITERIA FOR CLASS III LANDFILL SITES
(Construction-Demolition and Coal Combustion Wastes)

These design criteria are intended to limit the areal extent of ground water degradation. The overall guideline for limiting the zone of degradation, however, should be that no contamination will appear above background concentrations at the facility's property boundary, or within the nearest underlying aquifer.

I. General

- A. Siting/zoning authority shall be obtained from local unit of government, pursuant to Section 39 of the Act.
- B. Surface
 - 1. Buffer zone, consisting of a minimum fifty foot setback from property line to waste boundary.
 - 2. Fence, minimum 6 foot high chain link type with gate for access/security control, at property boundary.
 - 3. No facility shall be located within the 100-year flood plain as indicated by U.S.G.S. Flood Prone Area Map series.
- C. Subsurface - Minimum five feet vertical distance from bottom of 10' liner (in situ or placed) to seasonal high regional ground water table.
- D. Noise - Mufflers, berms, and other sound shielding devices shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operations, in accordance with Chapter 8: Noise Regulations.
- E. Site Concealment - Facility location and design shall provide for the concealment of the operations from public view.

II. Soils and Geologic Requirements

- A. Geology - General description (soils, lithology, depth to water, method of deposition of unconsolidated material) of local (within 2 mile radius of site) geologic setting.
- B. Soils
 - 1. Testing
 - a. Borings - (conducted in accordance with ASTM:D1452) Minimum 6 borings per the initial 10 acres with 1 additional boring, minimally required, for each

additional 5 acres. Borings shall be completed to a minimum 30' below lowest waste boundary (e.g., trench floor) and shall be located in a manner that accurately represents the geologic variations of the site. The Agency reserves the right to require additional borings.

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- b. Soil Sampling - Soils samples shall be collected from all borings using continuous sampling intervals thereby securing a complete soil column representative of the stratigraphic variations in each boring. These samples shall be collected in accordance with ASTM:D1586 and/or D1587 and shall be retained for Agency inspection until such time a Developmental Permit has been granted.
 - c. Grain Size Analyses - Minimum one analysis for each boring and each soil type classified in the field in accordance with ASTM:D420 and D2488. All analyses shall be conducted in accordance with ASTM:D421-422, specifically, including Hydrometer Tests, and recorded on Standard Grain Size Analysis Curves. Each sample shall also be plotted on a tri-coordinate graph for soil classification using system described by Shepard in "Nomenclature Based on Sand-Silt Clay Ratios," published in Journal of Sedimentary Petrology, v. 24, p. 151-158.
 - d. Ion Exchange Capacity - Tests shall be performed minimally once per each boring, including a representative of each unconsolidated material type present on site, conducted in accordance with the American Society of Agronomy method, using a one normal solution of NH_4 aqueous at $\text{pH } 7.0 \pm 0.1$.
 - e. Atterberg Limits (Liquid Limit, Plastic Limit and Plasticity Index) - Shall be performed minimally per each auger boring including a representative of each unconsolidated material type present on site conducted in accordance with ASTM:D423-424.
 - f. Hydraulic conductivity (permeability) - Test shall be performed minimally once per each boring to include each unconsolidated material found at the site.
 - 1) Applicant shall specify method used.
 - 2) Perform vertical and lateral testing for in-situ soils. For placed and compacted liners, perform tests on soil mix to be used for the liner.

- 3) Samples shall be obtained by thin-walled (Shelby) tubes (minimum 3 inch diameter).
- g. Specific yield (effective porosity) - Perform tests on liner soils (in-situ or placed, as designed).
- h. Attenuation mechanisms of the proposed soil liner.
- i. Structural strength.

2. Soil Study Report

- a. Test Results - All test results shall be included and certified as to being conducted in accordance with the cited Standard Method.
- b. All field study work including but not limited to borings, field classification of soils, and documentation of procedures shall be conducted in accordance with ASTM:D420 and D2488 and certified by a qualified geologist or geotechnical engineer.
- c. Minimum three cross sections (indicating scale and/or any exaggeration used) depicting the stratigraphic relationship of soils (and bedrock, where identified in borings.)
- d. Discussion of soil structure (i.e. cementation, fracturing, grain shape, etc.)
- e. Discussion of soil testing results.
- f. Discussion of soil utilization (i.e. cover, liner material, etc.)

C. Hydrogeology

1. Data Collection and Testing

- a. pump tests on permeable units
- b. water levels at each boring location after boring and at stabilization
- c. description of water bearing units
- d. determination of hydraulic head, i.e., gradient, fluctuations

2. Evaluation and Report

- a. Relationship between units, i.e., aquifers vs. aquitards vs. aquiclude
- b. Water balance study (site specific)

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- c. Assessment of water quality prior to facility development
 - d. Ground water level fluctuation study (site; region)
 - e. Evaluate influence of all potential ground water recharge and depletion sources within 1 mile radius, e.g., lagoons, lakes, industrial wells, water supply wells, field tiles, etc.
 - f. Description of hydrologic setting of site (present)
 - g. Description of paleo-hydrologic setting of site
 - h. Piezometric surface maps (present and projected)
3. Water Quality Impact Assessment
- a. Theoretical containment time (1st arrival in wells)
 - b. "Worst Case" scenario effects (i.e., liner failure)
 - c. Contingency plan for controlling leachate plume(s)

III. Liner Requirements (in situ, or placed & compacted)

- A. Five foot thick clay soil liner (bottoms and side seals) shall:
- 1. Exhibit maximum permeability of 1×10^{-7} cm/sec in both horizontal and vertical planes.
 - 2. Demonstrate minimal compaction to 95% Proctor Density in accordance with ASTM:D698.
 - 3. All side seals shall be keyed at least 3 feet into soils of the bottom liner exhibiting maximum permeability of 1×10^{-7} cm/sec.
- B. Berms and liner shall be 2-3 feet higher than the waste level.

IV. Cover Material

- A. Suitability - Cover shall be demonstrated to minimally meet the following criteria:
- 1. Cover shall contain less than 50% (by weight) sand or coarser material (i.e., less than .05 mm as per U.S.D.A.).
 - 2. Cover shall contain more than 5% (by weight) clay (i.e., greater than .0002 mm as per U.S.D.A.).

B. Cover Source Evaluation - Initial soils balance study shall minimally include the following data:

1. All calculations used to determine amount of cover necessary to facilitate compliance with cover requirements for each operating day, operating year, and the operating life of the site.
2. Calculations of other methodology used to determine total volumes of suitable cover available from all indicate borrow areas.
3. Narrative explaining the basis for the method of calculating those items required above.
4. Evaluations shall be certified by Professional Engineer.

The Agency reserves the right to require any additional data to determine the validity of any evaluation so as to ensure compliance with all regulations of this Chapter and the Act.

V. Surface water, erosion, and landscape management plan - plan shall minimally include but not be limited to the following data:

- A. Narrative, plan and design addressing Run-on Management, i.e., the prevention of run-on entering fill areas.
- B. Narrative, plan and design addressing Run-off Management, specifically including the management of contaminated run-off.
- C. Narrative, plan and design addressing surface drainage management specifically including management during development, operation, and after the site is closed. Plan shall be developed in accordance with local soil and water conservation district standards.
- D. Narrative, plan and design of erosion management specifically including management during development, operation, and after the site is closed.
- E. Narrative, plan and design of landscape management specifically including management of vegetation in the buffer zone during development, operation, after the site is closed.

VI. Ground Water Monitoring Program Requirements (Appendix II)

VII. Gas Management System - (Reserved)

VIII. Closure Design Requirements

- A. Final cover shall be a minimum of two feet of cover material (see Section IV A. in this Chapter).

- B. Vegetative cover to protect liner systems and promote drainage without erosion.
- C. Slopes on completed facility shall be no greater than 3 to 1 (horizontal to vertical) and no lesser than 33 to 1 to promote drainage and minimize erosion.

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DESIGN CRITERIA FOR CLASS IV LANDFILL SITES*
Homogeneous, Non-Putrescible Waste
(excludes combustibles, metals, Special Wastes)

*Option - Give these sites a permit by rule with the above regulations as operational requirements. The site would only have to notify the Agency of its location and obtain local approval.

I. General

- A. Siting/zoning authority shall be obtained from local unit of government, pursuant to Section 39 of the Act.

B. Surface

1. Fifty foot setback from property line to waste boundary.
2. Fence, minimum 6 foot high chain link type with gate for access/security control, at property boundary.

- C. Noise - Mufflers, berms, and other sound shielding devices shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operations, in accordance with Chapter 8: Noise Regulations.

- D. Site Concealment - Facility location and design shall provide for the concealment of the operations from public view.

II. Cover Material

- A. Suitability - Cover shall minimally meet the following criteria:

1. Cover shall contain less than 50% (by weight) sand or coarser material (i.e., less than .05 mm as per U.S.D.A.).
2. Cover shall contain more than 5% (by weight) clay (i.e., greater than .0002 mm as per U.S.D.A.).

III. Surface water, erosion, and landscape management plan - plan shall minimally include but not be limited to the following data:

- A. Narrative, plan and design addressing Run-on Management, i.e., the prevention of run-on entering fill areas.
- B. Narrative, plan and design addressing Run-off Management, specifically including the management of contaminated run-off.
- C. Narrative, plan and design addressing surface drainage management specifically including management during development, operation, and after the site is closed. Plan shall be developed in accordance with local soil and water conservation district standards.

- D. Narrative, plan and design of erosion management specifically including management during development, operation, and after the site is closed.
- E. Narrative, plan and design of landscape management specifically including management of vegetation in the buffer zone during development, operation after the site is closed.

III. Closure Design Requirements

- A. Final cover shall be a minimum of two feet of cover material (see Section IV A. in this Chapter).
- B. Vegetative cover to protect liner systems and promote drainage without erosion.
- C. Slopes on completed facility shall be no greater than 3 to 1 (horizontal to vertical) and no less than 33 to 1 to promote drainage and minimize erosion.

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CRITERIA FOR SURFACE IMPOUNDMENTS

These design criteria are intended to limit the areal extent of ground water degradation. The overall guideline for limiting the zone of degradation, however, should be that no contamination will appear above background concentrations at the facility's property boundary, or within the nearest underlying aquifer.

I. Applicability

- A. These regulations apply to owners and operators of facilities that use surface impoundments to treat or store hazardous and non-hazardous waste.
- B. Impoundments designed for disposal of hazardous and non-hazardous wastes shall meet all the criteria and requirements for a Class I and Class II landfill, respectively.

II. General

- A. Siting/zoning authority for new surface impoundments shall be obtained from local unit of government, pursuant to Section 39 of the Act.

~~B. Surface~~

- 1. Buffer zone, consisting of a minimum two hundred foot setback from property line to waste boundary.
 - 2. Fence, minimum 6 foot high chain link type with gate for access/security control, at property boundary.
 - 3. No facility shall be located within the 100-year flood plain as indicated by U.S.G.S. Flood Prone Area Map series.
 - 4. All earthen dikes must have a protective cover, such as grass, shale, or rock, to minimize wind and water erosion and to preserve their structural integrity.
- C. Subsurface - Minimum in the range of five to ten feet vertical distance from bottom of 10' liner (in situ or placed) to seasonal high regional ground water table.
 - D. Noise - Mufflers, berms, and other sound shielding devices shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operations, in accordance with Chapter 8: Noise Regulations.
 - E. Site Concealment - Facility location and design shall provide for the concealment of the operations from public view.

III. Soils & Geologic Requirements

A. Geology - General description (soils, lithology, depth to water, method of deposition of unconsolidated material) of local (within 2 mile radius of site) geologic setting.

B. Soils

1. Testing

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a. Borings - (conducted in accordance with ASTM:D1452) Minimum 6 borings per the initial 10 acres with 1 additional boring, minimally required, for each additional 5 acres. Borings shall be completed to a minimum 30' below lowest waste boundary (e.g., trench floor) and shall be located in a manner that accurately represents the geologic variations of the site. The Agency reserves the right to require additional borings.

b. Soil Sampling - Soils samples shall be collected from all borings using continuous sampling intervals thereby securing a complete soil column representative of the stratigraphic variations in each boring. These samples shall be collected in accordance with ASTM:D1586 and/or D1587 and shall be retained for Agency inspection until such time a Developmental Permit has been granted.

c. Grain Size Analyses - Minimum one analysis for each boring and each soil type classified in the field in accordance with ASTM:D420 and D2488. All analyses shall be conducted in accordance with ASTM:D421-422, specifically, including Hydrometer Tests, and recorded on Standard Grain Size Analysis Curves. Each sample shall also be plotted on a tri-coordinate graph for soil classification using system described by Shepard in "Nomenclature Based on Sand-Silt Clay Ratios," published in Journal of Sedimentary Petrology, v. 24; p. 151-158.

d. Ion Exchange Capacity - Tests shall be performed minimally once per each boring, including a representative of each unconsolidated material type present on site, conducted in accordance with the American Society of Agronomy method, using a one normal solution of NH_4 aqueous at $\text{pH } 7.0 \pm 0.1$.

e. Atterberg Limits (Liquid Limit, Plastic Limit, and Plasticity Index) - Shall be performed minimally per each boring including a representative of each unconsolidated material type present on site conducted in accordance with ASTM:D423-424.

- f. Hydraulic conductivity (permeability) - Tests shall be performed minimally once per each boring to include each unconsolidated material found at the site.

- 1) Applicant shall specify method used.
- 2) Perform vertical and lateral testing for in-situ soils. For placed and compacted liners, perform tests on soil mix to be used for the liner.
- 3) Samples shall be obtained by thin-walled (Shelby) tubes (minimum 3 inch diameter).

- g. Specific yield (effective porosity) - Perform tests on liner soils (in-situ or placed, as designed).

- h. Attenuation mechanisms of the proposed soil liner.

- i. Structural strength.

2. Soil Study Report

- a. Test Results - All test results shall be included and certified as to being conducted in accordance with the cited Standard Method.
- b. All field study work including but not limited to borings, field classification of soils, and documentation of procedures shall be conducted in accordance with ASTM:D420 and D2488 and certified by a qualified geologist or geotechnical engineer.
- c. Minimum three cross sections (indicating scale and/or any exaggeration used) depicting the stratigraphic relationship of soils (and bedrock, where identified in borings.)
- d. Discussion of soil structure (i.e. cementation, fracturing, grain shape, etc.)
- e. Discussion of soils testing results.
- f. Discussion of soil utilization (i.e. cover, liner material, etc.)

C. Hydrogeology

1. Data Collection and Testing

- a. pump tests on permeable units
- b. water levels at each boring location after boring and at stabilization

- c. description of water bearing units
- d. determination of hydraulic head, i.e., gradient, fluctuations

2. Evaluation and Report

- a. Relationship between units, i.e., aquifers vs. aquitards vs. aquiclude
- b. Water balance study (site specific)
- c. Assessment of water quality prior to facility development
- d. Groundwater level fluctuation study (site; region)
- e. Evaluate influence of all potential ground water recharge and depletion sources within 1 mile radius, e.g., lagoons, lakes, industrial wells, water supply wells, field tiles, etc.
- f. Description of hydrologic setting of site (present)
- g. Description of paleo-hydrologic setting of site
- h. Piezometric surface maps (present and projected)

3. Water Quality Impact Assessment

- a. Theoretical containment time (1st arrival in wells)
- b. "Worst Case" scenario effects (i.e., liner failure)
- c. Contingency plan for controlling leachate plume(s)

IV. Liner Requirements (in situ, or placed & compacted) for treatment or storage of hazardous waste in an impoundment.

A. Ten foot thick clay soil liner (bottoms and side seals) shall:

- 1. Exhibit maximum permeability of 1×10^{-8} cm/sec in both horizontal and vertical planes.
- 2. Demonstrate minimal compaction to 95% Proctor Density in accordance with ASTM:D698.
- 3. All side seals shall be keyed at least 3 feet into soils of the bottom liner exhibiting minimum permeability of 1×10^{-8} cm/sec.

B. Berms and liner shall be 2-3 feet higher than the waste level.

C. An artificial liner that is compatible with the waste to be emplaced and is at least 60 to 100 mil thick shall be placed above the clay liner. Any emplaced liner material must be installed in a manner that will protect the function and physical integrity of the liner.

D. A leachate detection and collection system shall be installed between the clay liner and artificial liner. The detection system shall be checked quarterly for the presence of leachate. If leachate is present, it shall be sampled and analyzed for the parameters present in the waste. Results shall be submitted to the Agency. Leachate shall be pumped from the collection system and managed.

E. Compatibility of waste and liner shall be demonstrated.

V. Liner Requirements (in situ, or placed & compacted) for treatment or storage of non-hazardous waste in an impoundment.

A. Five foot thick clay soil liner (bottoms and side seals) shall:

1. Exhibit maximum permeability of 1×10^{-8} cm/sec in both horizontal and vertical planes.
2. Demonstrate minimal compaction to 95% Proctor Density in accordance with ASTM:D698.
3. All side seals shall be keyed at least 3 feet into soils of the bottom liner exhibiting maximum permeability of 1×10^{-8} cm/sec.

B. Berms and liner shall be 2-3 feet higher than the waste level.

C. An artificial liner that is compatible with the waste to be emplaced and is at least 60 to 100 mil thick shall be placed above the clay liner. Any emplaced liner material must be installed in a manner that will protect the function and physical integrity of the liner.

D. A leachate detection and collection system shall be installed between the clay liner and artificial liner. The detection system shall be checked quarterly for the presence of leachate. If leachate is present, it shall be sampled and analyzed for the parameters present in the waste. Results shall be submitted to the Agency. Leachate shall be pumped from the collection system and managed.

E. Compatibility of waste and liner shall be demonstrated.

VI. Surface water, erosion, and landscape management plan - plan shall minimally include but not be limited to the following data:

- A. Narrative, plan and design addressing Run-on Management, i.e., the prevention of run-on entering the impoundment.
- B. Narrative, plan and design addressing Run-off Management, specifically including management of contaminated run-off.
- C. Narrative, plan and design addressing surface drainage management specifically including the management during development, operation, and after the site is closed.
- D. Narrative, plan and design of erosion management specifically including management during development, operation, and after the site is closed.
- E. Narrative, plan and design of landscape management specifically including management of vegetation in the buffer zone during development, operation, after the site is closed.

VII. Ground Water Monitoring Program Requirements (Appendix I or Appendix II)

VIII. Closure Design Requirements - Treatment or Storage Impoundments

- A. Upon closure of an impoundment for storage and treatment, all waste shall be removed and properly disposed at an Agency permitted site.
- B. Soil samples taken from below the impoundment shall be tested for constituents of the waste and results submitted to the Agency.
- C. Contaminated soil shall be removed in accordance with a plan submitted to and approved by the Agency.
- D. Final cover shall be a minimum of two feet of suitable cover material.
 - 1. Cover shall contain less than 50% (by weight) sand or coarser material (i.e., less than .05 mm as per U.S.D.A.).
 - 2. Cover shall contain more than 5% (by weight) clay (i.e., greater than .0002 mm as per U.S.D.A.).
- E. Vegetative cover shall be provided to protect final cover and promote drainage without erosion.
- F. Slopes on completed facility shall be no greater than 3 to 1 (horizontal to vertical) and no less than 33 to 1 to promote drainage and minimize erosion.

CRITERIA FOR TANKS

I. Applicability

These regulations apply to owners and operators of facilities that use tanks to treat or store waste.

II. Definitions

"Above ground tank" is a tank located entirely off the ground so that all sides and the bottom may be visually inspected externally for integrity, or such that the bottom only is in contact with a concrete pad.

"In ground tank" is a tank located so that the bottom and part of the sides are below ground level and not available for external visual inspection.

"On ground tank" is a tank located such that the bottom only is not available for external visual inspection and is not resting on a concrete pad.

"Below ground tank" is a tank located entirely below ground level.

III. Construction Requirements

A. General

Primary and secondary containment devices shall be provided and shown in detail on plan sheets and described in narrative form with any application for permit, including location, dimensions, cross sections, and all requirements contained herein. The distance from the bottom of a below ground, on-ground, in-ground tank to the seasonal or yearly high water table shall be a minimum of five feet. Depth to the water table shall be established from the Illinois State Water Survey records. In addition, for tanks containing hazardous waste, the depth to the water table shall be defined by the soil borings.

B. Primary Containment

Existing shell thickness (inches) shall be stated for each tank. Minimum shell thickness shall be calculated as follows (API Standard 650, see Appendix A):

T = Minimum shell thickness (INCHES)
D = Tank diameter (FEET)
H = Heights to overfilling (FEET)
G = Specific gravity of waste (not less than 1)

$$T = \frac{2.6 D (H-1) G}{(.85) 21,000}$$

Corrosion rate (inches/year) shall be provided, based on material of construction and waste to be contained. Expected service life shall be calculated as follows (API Standard 650, see Appendix A):

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$$\text{Expected Service Life (Years)} = \frac{\text{Current Thickness (inches)} - \text{Minimum Thickness (inches)}}{\text{Corrosion Rate (inches/year)}}$$

Covered or closed tanks in excess of 5,000 gallons may be subject to Chapter 2 Air Pollution Control Regulations, in addition.

Tanks shall be compatible with the waste to be placed in the tank or the tank shall be lined with a material compatible to the waste.

C. Secondary Containment

1. General

Secondary containment shall be provided for all above ground tanks and shall be capable of containing the volume of the largest tank or 10% of the total volume for multiple tank farms, whichever is greater. Secondary containment for in or on-ground tanks shall be capable of containing the volume of any portion of the tanks located above ground level.

Materials of construction shall be capable of containing a spill until cleanup is effected, i.e., concrete, clay. The base containment area shall likewise minimize vertical migration i.e., concrete, clay.

The Agency reserves the right to require testing of materials used in construction providing secondary containment.

A cover of crushed rock or vegative growth shall be placed on earthen embankments to prevent erosion.

Tanks shall be isolated from sewer drains.

2. Special Requirements for Incompatible Waste

If more than one waste type will be handled at a facility, and those types are incompatible then separate secondary containment shall be provided.

IV. Operating Requirements

A. General

Wastes or treatment reagents must not be placed in a tank if they could cause the tank or its inner liner to rupture, leak, corrode or otherwise fail before the end of its expected service life.

Uncovered tanks must be operated to ensure at least 60 centimeters (2 feet) of freeboard, unless the tank is equipped with a containment structure (e.g., dike or trench), a drainage control system or a diversion structure (e.g., standby tank) with a capacity that equals or exceeds the volume of the top 60 centimeters (2 feet) of the tank. Where waste is continuously fed into a tank, the tank must be equipped with a means to stop this inflow (e.g., a waste feed cutoff system or by-pass system to a stand-by tank).

Pressure testing shall be conducted annually for below, in, and on-ground tanks and associated piping in accordance with ASTM Standards. Above ground tanks shall be similarly tested every five years. The Agency shall receive results of a pressure test conducted within the last twelve months for any tank previously unused prior to introduction of waste into that tank.

Uncontaminated storm water runoff shall be removed from the secondary containment area immediately after a precipitation event.

Contaminated storm water runoff shall be handled in accordance with Chapter 3 - Water Pollution Control Regulations.

Integrity of the secondary containment shall be maintained.

All spills (regardless of volume) resulting in waste leaving the site shall be reported to the Agency.

A method shall be available for obtaining a sample from each tank.

A waste level indicator shall be installed, maintained and operated on each tank.

B. Special Requirement for Incompatible Wastes

Incompatible wastes, or incompatible wastes and materials, must not be placed in the same tank. Waste must not be placed in an unwashed tank which previously held an incompatible waste or material.

C. Special Requirement for Ignitable Or Reactive Wastes

(1) Ignitable or reactive waste must not be placed in a tank, unless:

(a) The waste is stored or treated in such a way that it is protected from any material or conditions which may cause the waste to ignite or react; or

(b) The tank is used solely for emergencies.

(2) The owner or operator of a facility which treats or stores ignitable or reactive waste in covered tanks must comply with the buffer zone requirements for tanks contained in Tables 2-1 through 2-6 of the National Fire Protection Association's "Flammable and Combustionable Liquids Code" (1977 or 1981), (incorporated by reference, see Section 720.111).

V. Inspections and Records

The owner or operator of a tank must inspect, where present:

- (1) Discharge control equipment (e.g., waste feed cutoff systems, by-pass systems and drainage systems) at least once each operating day for tanks containing hazardous waste, and weekly for tanks containing non-hazardous waste, to ensure that it is in good working order;
- (2) Data gathered from monitoring equipment (e.g., pressure and temperature gauges) at least once each operating day for tanks containing hazardous waste, and weekly for tanks containing non-hazardous waste, to ensure that the tank is being operated according to its design;
- (3) The level of waste in the tank, at least once each operating day for hazardous waste tanks, weekly for non-hazardous waste tanks.
- (4) The construction materials of the tank, at least weekly for hazardous waste tanks, monthly for non-hazardous waste tanks, to detect corrosion or leaking of fixtures or seams; and
- (5) The construction materials of, and the area immediately surrounding, discharge confinement structures (e.g., dikes) at least weekly for hazardous waste tanks, monthly for non-hazardous waste tank, to detect erosion or obvious signs of leakage (e.g., wet spots and dead vegetation).
- (6) A report log of any deficiencies, remedial actions, and date shall be kept at the facility and available for Agency inspection.

VI. Monitoring

Groundwater monitoring is required for all below, in, or on-ground tanks which contain waste in accordance with Appendix I or II.

Pressure testing may be required for below ground tanks and their associated piping.

VII. Closure

A. General

At closure, all waste and waste residues must be removed from tanks, from discharge control equipment, and from discharge confinement structures and properly disposed of in an Agency approved landfill.

B. Closure

The Agency shall be notified in writing of the closure of the facility.

C. Partial Closure

Partial closure, i.e., part of a facility no longer used for waste management purposes, shall be the subject of an application for supplemental permit to modify the site development submitted to this office 90 days prior to the closure.

CRITERIA FOR CONTAINERS

I. Applicability

These regulations apply to owners and operators of facilities that use containers to:

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- a. store hazardous waste generated on-site for more than ninety days after the accumulation period,
or
 - b. store special waste that is generated off-site and collected for storage prior to treatment or disposal.

A permit by rule shall be deemed issued to facilities that store up to 80 drums of on-site generated non-hazardous waste for 90 days or less. These sites shall follow the requirements set forth below.

II. Definition

"Container" is any portable device in which waste is stored, transported, treated, disposed, or otherwise handled, including but not limited to 55-gallon drums and roll-off boxes.

III. Construction Requirements

A. Primary containment

Containers shall be compatible with the waste to be placed in the container, or shall be lined with a material compatible to the waste.

B. Secondary Containment

1. Secondary containment shall be provided for all containers and shall be capable of containing the volume of 10% of the total volume of all the containers, or the volume of the largest container, whichever is greater.
2. Materials of construction shall be capable of containing a spill until clean-up is effected, i.e., concrete, clay. The base containment area shall likewise minimize vertical migration i.e., concrete, clay.
3. The Agency reserves the right to require testing of materials used in construction providing secondary containment.
4. A cover of crushed rock or vegetative growth shall be placed on earthen embankments to prevent erosion.

5. Fencing, minimum six foot high chain link type with a gate for access/security control, shall be provided.

C. Special Requirements For Incompatible Waste

If more than one waste type will be handled at a facility, and those types are incompatible, then separate secondary containment shall be provided, i.e. buffer.

IV. Operating Requirements

A. General

1. Condition of Container

If a container holding waste is not in good condition, or if it begins to leak, the owner or operator must transfer the waste from this container to a container that is in good condition, or transfer this container into an oversize container.

2. Compatibility of waste with container

The owner or operator must use a container made of or lined with materials which will not react with, and are otherwise compatible with, the waste to be stored, so that the ability of the container to contain the waste is not impaired.


3. Management of containers

- (a) A container holding waste must always be closed during storage, except when it is necessary to add or remove waste.
- (b) A container holding waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.
- (c) Containers shall be stacked to insure stability and aisle ways for emergency vehicle access shall be maintained.
- (d) Containers shall be labeled hazardous or non-hazardous at the beginning of the storage period.

4. Runoff

- (a) Uncontaminated storm water runoff shall be removed from the secondary containment area immediately after a precipitation event.

(b) Contaminated storm water runoff shall be handled in accordance with Chapter 3: Water Pollution Control Regulations.

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5. All spills (regardless of volume) resulting in waste leaving the site shall be reported to the Agency.
 6. Fiberpack drums utilized to store wastes must be stored in an enclosed building.
 7. Drums shall be stacked a maximum of two high on pallets. Drum racks shall be evaluated on an individual basis.
 8. All roll off boxes and portable tanks used for transportation shall be covered.
 9. All roll off boxes and portable tanks and containers used for storage/transport shall be constructed and maintained so as to not release waste materials to the environment.

B. Special requirements

1. For ignitable or reactive waste
 - a. Containers holding ignitable or reactive waste must be located at least 50 feet from the facility's property line.
 - b. Ignitable or reactive waste must not be placed in a container, unless the waste is stored in such a way that it is protected from any material or conditions which may cause the waste to ignite or react.
 - c. The owner or operator of a facility which treats or stores ignitable or reactive waste in containers must comply with the buffer zone requirements for containers in Tables 2-1 through 2-6 of the National Fire Protection Association's "Flammable and Combustionible Liquids Code" (1977 or 1981), (incorporated by reference, see Section 721.111).
2. For incompatible wastes
 - a. Incompatible wastes or incompatible waste and materials must not be placed in the same container.
 - b. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

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- c. A storage container holding a hazardous waste that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device. The purpose of this is to prevent fires, explosions, gaseous emissions, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the mixing of the incompatible waste or materials if containers break or leak.

V. Inspections and Records

- A. The owner or operator of a container storage area must inspect, where present:
 - 1. The construction materials providing secondary containment, at least weekly for hazardous waste container areas, at least monthly for non-hazardous waste container areas, to detect deterioration; and
 - 2. The construction materials of, and the area immediately surrounding discharge confinement structures (e.g., dikes) at least weekly for hazardous waste containers, monthly for non-hazardous waste containers, to detect erosion or obvious signs of leakage (e.g., wet spots and dead vegetation).
- B. Records shall be kept at the facility and be available for Agency inspection of the deficiencies noted, date, and remedial action taken.

VIII. Closure

A. General

At closure, all containers must be removed from the site.

B. Closure Plan

A closure plan shall be submitted to the Agency for approval 180 days prior to closure.

C. Partial Closure

Partial closure (*) shall be the subject of an application for supplemental permit to modify the site development submitted to this office 90 days prior to the closure.

*(Part of a facility no longer used for waste management purposes)

CRITERIA FOR TREATMENT-STORAGE FACILITIES

I. Applicability

These criteria apply to owners and operators of facilities that store, treat, process, and/or transfer non-hazardous special waste generated off-site and hazardous waste generated on or off-site.

II. General

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- A. Siting/zoning authority pursuant to Section 39 of the Act.
 - B. Surface
 - 1. Fence (6-foot high chain-link type) or
 - 2. Totally enclosed building.
 - C. Facilities that manage hazardous waste shall be located
 - 1. outside the 100-year flood plain, or
 - 2. in an area protected from the 100-year flood by U.S. Army Corps of Engineers-constructed levees.
 - D. The best available technology (mufflers, berms, and other sound shielding devices) shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operations.
 - E. Facilities which manage both hazardous and non-hazardous waste shall be designed and managed as a hazardous waste facility.
 - F. The following documents are hereby incorporated as part of this document:
 - 1. Criteria for Tanks
 - 2. Criteria for Containers
 - 3. Criteria for Surface Impoundments.

III. Safety

- A. Facility shall have a contingency plan to address any accident or equipment failure at the site (per RCRA), for hazardous and non-hazardous waste facilities.
- B. Facility shall have and maintain means to manage spills, leaks, etc. i.e., sorbent, pumps.
- C. Spills
 - 1. Facility shall have (liquid) spill containment device(s) in the loading/unloading area(s) i.e., paved with curb, or grate and sump, or berm and graded to collect liquid.
 - 2. Spills which leave the property boundary or secondary containment device shall be cleaned up immediately and reported to the Agency.

IV. Segregation

- A. Hazardous Waste shall be segregated from non-hazardous waste.
- B. Waste shall be segregated from product.
- C. Sites shall implement a plan to segregate and manage non-hazardous waste types which may adversely interact i.e., alkali-acid wastes, combustible-non-combustible wastes.

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V. Operation

- A. Site equipment shall be maintained and managed so as not to cause or allow discharge, leak, or emission to the environment.
- B. A waste sampling method or mechanism shall be maintained at the site.
- C. Tanks containing waste shall have an operable gauge for measuring liquid level.
- D. Tanks shall be located entirely off the ground or on a paved area; or shall be monitored (monitor wells or other testing devices).
- E. Tanks with an automatic feed shall have an operable automatic shutoff.
- F. There shall be a means to isolate waste during analysis/testing prior to processing or mixing with other wastes or substances.
- G. All loading/unloading of special wastes shall be accomplished over spill containment devices.
- H. Volumes of waste at the site at any time shall not exceed the capacity (volumes) of treatment and storage areas.

VI. Manifests

- A. Special wastes received at the site from off-site shall be transported to the facility utilizing the Agency's supplemental permit system and manifest system.
- B. Special wastes generated at the site for disposal, storage, incineration or further treatment elsewhere shall be transported to the receiving facility utilizing the Agency's supplemental permit system and manifest system.

VII. Modifications

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- A. Any modification to the facility, treatment process, types or amounts of wastes handled shall be the subject of an application for supplemental permit for site modification submitted to this Division.
 - B. Permittee shall notify this Division of any changes from the information submitted to the Agency in its application for a developmental and operating permit for this site. Permittee shall notify the Agency of any changes in the names or addresses of both beneficial and legal titleholders to the herein-permitted site. Such notification shall be made in writing within fifteen (15) days of such change and shall include the name or names of any parties in interest and the address of their place of abode; or, if a corporation, the name and address of its registered agent.

VIII. Waste Analysis

There shall be a means to analyze incoming waste to assure proper identification and chemical compatibility with processes/and other wastes.

IX. Closure Requirements

- A. Treatment - storage - processing facilities shall remove and properly dispose of all wastes prior to closure (unless site includes disposal areas).
- B. Portions of a facility which may be disposal areas (i.e., landfill or impoundment) shall be closed according to closure requirements for those portions.
- C. Upon performance of all applicable completion and closure requirements, and certification by a P.E., the owner and the operator shall immediately notify the Agency of such performance of all requirements.
- D. After notification, the Agency shall inspect the site to determine if all applicable completion and closure requirements have been complied with.
- E. If the Agency finds that all applicable completion and closure requirements have been complied with, the Agency shall certify, in writing, to the owner and the operator that the completion and closure requirements have been met.
- F. Partial closure of any portion shall conform with A-E above.

CRITERIA FOR MUNICIPAL WASTE TRANSFER STATIONS

I. Applicability

These criteria apply to owners and operators of facilities that collect and store municipal waste prior to removal to a permitted facility for processing or disposal.

II. General

A. Siting/zoning authority pursuant to Section 39 of the Act.

B. Surface

1. Fence (6-foot high chain-link type) or
2. Totally enclosed building

III. Safety

Facility shall have a contingency plan to address any accident or equipment failure at the site.

IV. Operation

- A. A notice stating the hours of operation of the transfer station shall be conspicuously posted at the entrance to the site.
- B. Compacted waste may be stored overnite in a transfer trailer either inside the transfer station floor or on the grounds of the facility.
- C. All buildings, containers and other equipment in the transfer station shall be cleaned at the end of each operating day.
- D. All litter shall be collected from the transfer station and grounds and properly handled at the end of each day or more often if necessary.
- E. The company shall employ a vector control specialist to inspect the transfer station area at least once a month and report results to the company. If necessary vector control measures shall be taken.
- F. No municipal waste transfer station shall accept, receive, store or transfer special waste.

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V. Closure

- A. At closure the facility owner/operator shall notify the Agency of closure of the facility.
- B. If the Agency finds that all waste has been removed, the Agency shall certify, in writing, to the owner and operator that the completion and closure requirements have been met.

VI. Post-closure

After closure, the owner of the property shall maintain the site for one year. All waste, litter, vector and odor problems shall be remedied by the owner/operator.

APPENDIX I

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Subpart F: Groundwater Monitoring for Hazardous Waste Facilities

Section 725.190 - Applicability

- a. By no later than November 19, 1981, the owner or operator of a surface impoundment, landfill, land treatment, or inground, onground, underground tank facility which is used to manage hazardous waste must implement a groundwater monitoring program which is minimally capable of determining the facility's impact on the quality of the groundwater underlying the facility, except as Section 725.101 provides otherwise.
- b. The owner or operator must develop, install, operate and maintain a groundwater monitoring system which meets the requirements of Section 725.191 and must comply with Sections 725.192-725.194. The plan for this monitoring system must be submitted to the Agency for approval. This groundwater monitoring program must be carried out during the active life of the facility and for disposal facilities during the post-closure care period as well.

Section 725.191 - Groundwater Monitoring System

- a. A groundwater monitoring system must be minimally capable of yielding groundwater samples for analysis and must consist of:
 1. Monitoring wells (at least one) installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the waste management area. Their number, locations and depths must be sufficient to yield groundwater samples that are:
 - A. Representative of groundwater quality near the facility; and
 - B. Not affected by the facility; and
 2. Monitoring wells (at least three) installed hydraulically downgradient (i.e., in the direction of decreasing static head) within 10-25 feet of the liner or waste boundary. Their number, locations and depths must ensure that they immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area.
 3. The Agency reserves the right to require the addition of additional monitoring devices.

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- b. All monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. The casing material used must be such that it will not leach or adsorb contaminants to or from the sample. (Any type of casing requiring cement type couplings is not permitted). This casing must have an inside diameter of not less than 2 inches and not more than 4 inches. The casing must be screened or perforated and packed with gravel or sand where necessary to enable sample collection at depths where groundwater flow zones exist. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed with a suitable material (e.g. cement grout or bentonite slurry) to prevent contamination of samples and the groundwater. The portion of the well casing, extending above the ground surface, must be protected so that it cannot be damaged or tampered with.

Section 725.192 - Sampling and Analysis

- a. The owner or operator must obtain and analyze samples from the installed groundwater monitoring system. The owner or operator must develop and follow a groundwater sampling and analysis plan. This plan must be submitted to the Agency for approval. He must also keep this plan at the facility. The plan must include detailed procedures and techniques for:
1. Sample collection - Procedure must be such that the sample collected is representative of the zone being monitored. Also, sample collection techniques must be such that cross contamination from one monitoring well to another or from one sample to another will not occur;
 2. Sample preservation and shipment;
 3. Analytical procedures; and
 4. Chain of custody control

Comment: See "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities", EPA-530/SW-611, August 1977 and "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1979 for discussions of sampling and analysis procedures.

- b. The owner or operator must determine the concentration or value of the following parameters in groundwater samples in accordance with paragraphs (c) and (d) of this section:
1. Parameters characterizing the suitability of the groundwater as a drinking water supply:

<u>Parameter</u>	<u>Maximum Level (mg/l)</u>
A. Arsenic	0.05
B. Barium	1.0
C. Cadmium	0.01
D. Chromium	0.05
E. Fluoride	1.4-2.4

F.	Lead	0.05
G.	Mercury	0.002
H.	Nitrate (as N)	10
I.	Selenium	0.01
J.	Silver	0.05
K.	Endrin	0.0002
L.	Lindane	0.004
M.	Methoxychlor	0.1
N.	Toxaphene	0.005
O.	2,4-D	0.1
P.	2,4,5-TP Silvex	0.01
Q.	Radium	5 pCi/l
R.	Gross Alpha	15 pCi/l
S.	Gross Beta	4 millirems/year
T.	Turbidity	1/TU
U.	Coliform Bacteria	1/100 ml

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2. Parameters establishing groundwater quality:

- A. Chloride
- B. Iron
- C. Manganese
- D. Phenols
- E. Sodium
- F. Sulfate

Comment: These parameters are to be used as a basis for comparison in the event a groundwater quality assessment is required under Section 725.193(d).

3. Parameters used as indicators of groundwater contamination:

- A. pH
- B. Specific Conductance
- C. Total Organic Carbon
- D. Total Organic Halogen

4. Any additional parameters deemed necessary by the Agency.

5. The schedule for sample collection is as follows:

Results Due in Accordance
with Sections 725.194(a)(2)(B)

Samples to be Collected
During the Month of

15th of January

December

15th of April

March

15th of July

June

15th of October

September

- c. 1. For each monitoring well, the owner or operator must establish initial concentrations or values of all parameters specified in paragraph (b) of this section. He must do this quarterly for one year. For each of the parameters specified in paragraph (b)(3), plus any additional parameters deemed necessary by the Agency, at least four replicate measurements must be obtained for each sample.
2. For each of the parameters specified in paragraph (b)(3), excluding pH, plus any additional parameters deemed necessary by the Agency, the initial background arithmetic mean and variance must be determined for each well by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained during the first year. For pH, a transformation to the hydrogen ion concentration in moles per liter of each replicate measurement must be completed prior to determining a geometric mean and variance for each well for samples obtained during the first year.
- d. After the first year, each monitoring point must be sampled quarterly and the samples analyzed for the parameters specified in paragraphs (b)(2), (b)(3) and (b)(4). Sample collection must be done according to the schedule outlined in (b)(5). Samples collected once during the year as specified by permit must also be analyzed for the parameters specified in paragraphs (b)(1) in addition to the parameters specified in paragraphs (b)(2), (b)(3), and (b)(4).

For each parameter specified in 725.192(b)(3), except pH, plus any additional parameters deemed necessary by the Agency, the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well and compare these results with its initial arithmetic mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases over initial quality. For pH, the owner or operator must calculate a transformation to the hydrogen ion concentration in moles per liter of each of four replicate measurements prior to determining the

geometric mean and variance for each well and compare these results with the initial geometric mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases or decreases over initial quality.

- e. Elevation of the groundwater surface at each monitoring well must be determined each time a sample is obtained. This determination is to be made prior to any water being withdrawn from the monitor well.
- f. The temperature of the groundwater sample is to be determined each time a sample is obtained.
- g. The depth to the bottom of the well, as measured from ground level, is to be determined each time a sample is obtained.

Source: Amended at 6 Ill. Reg. _____, effective as noted in Section 700.106.

Section 725.193 - Preparation, Evaluation and Response

- a. By no later than November 19, 1981, the owner or operator must prepare an outline of a groundwater quality assessment program. The outline must describe a more comprehensive groundwater monitoring program (than that described in Sections 725.191 and 725.192) capable of determining:
 - 1. Whether hazardous waste or hazardous waste constituents have entered the groundwater;
 - 2. The rate and extent of migration of hazardous waste or hazardous waste constituents in the groundwater; and
 - 3. The concentrations of hazardous waste or hazardous waste constituents in the groundwater.
- b. For each parameter specified in 725.192(b)(3), except pH, plus any additional parameters deemed necessary by the Agency, the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well and compare these results with its initial arithmetic mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases over initial quality. For pH, the owner or operator must calculate a transformation to the hydrogen ion concentration in moles per liter of each of four replicate measurements prior to determining the geometric mean and variance for each well and compare these results with the initial geometric mean. The comparison must consider each

of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases or decreases over initial quality.

- c. 1. If the comparisons for the wells made under paragraph (b) of this section show a significant increase (or pH decrease) the owner or operator must submit this information in accordance with Section 725.194(a)(2)(D).
2. If the comparisons for wells made under paragraph (b) of this section show a significant increase (or pH decrease) the owner or operator must then immediately obtain additional groundwater samples from those wells where significant difference was detected, split the samples in two and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error.
- d. 1. If the analyses performed under paragraph (c)(2) of this section confirm the significant increase (or pH decrease) the owner or operator must provide written notice to the Director -- within seven days of the date of such confirmation -- that the facility may be affecting groundwater quality.
2. Within 15 days after the notification under paragraph (d)(1) of this section, the owner or operator must develop and submit to the Director a specific plan, based on the outline required under paragraph (a) of this section and certified by a Certified Professional Geological Scientist (CPGS) or geotechnical engineer for a groundwater quality assessment program at the facility.
3. The plan to be submitted under paragraph (d)(2) of this section must specify:
 - A. The number, location and depth of wells;
 - B. Sampling and analytical methods for those hazardous wastes or hazardous waste constituents in the facility;
 - C. Evaluation procedures, including any use of previously gathered groundwater quality information; and
 - D. A schedule of implementation.
4. The owner or operator must implement the groundwater quality assessment plan which satisfies the requirements of paragraph (d)(3) of this section and, at a minimum, determine:
 - A. The rate and extent of migration of the hazardous waste or hazardous waste constituents in the groundwater; and

5. B. The concentrations of the hazardous waste or hazardous waste constituents in the groundwater.
5. The owner or operator must make his first determination under paragraph (d)(4) of this section as soon as technically feasible and, within 15 days after that determination, submit to the Director a written report containing an assessment of the groundwater quality.
6. If the owner or operator determines and the Agency concurs, based on the results of the first determination under paragraph (d)(4), that no hazardous waste or hazardous waste constituents from the facility have entered the groundwater, then he may reinstate the monitoring program described in Section 725.192 and paragraph (b) of this section. If the owner or operator reinstates the indicator evaluation program, he must so notify the Director in the report submitted under paragraph (d)(5) of this section.
7. If the owner or operator and/or the Agency determines, based on the first determination under paragraph (d)(4), that hazardous waste constituents from the facility have entered the groundwater, then he:
- A. Must continue to make the determinations required under paragraph (d)(4) of this section on a quarterly basis; and
 - B. Immediately implement the facility's contingency plan as specified by Subpart D of Part 725 or any other, Agency approved, remedial plan.

Note: Section 725.152(a) needs to be amended to require a contingency plan to describe the actions the facility must take in response to the sudden or non-sudden release of hazardous waste or hazardous waste constituents to the groundwater.

- e. Notwithstanding any other provision of this subpart, any groundwater quality assessment to satisfy the requirements of Section 725.193(d)(4) which is initiated prior to the end of the post-closure period for the facility must be completed and reported in accordance with Section 725.193(d)(5).
- f. Unless the contingency plan is implemented, at least annually the owner or operator must evaluate the data on groundwater surface elevations obtained under Section 725.192(e) to determine whether the requirements under Section 725.191(a) for locating the monitoring wells continues to be satisfied. If the evaluation shows that Section 725.191(a) is no longer satisfied, the owner or operator must immediately propose and obtain a permit from the Agency to modify the number, location or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement.

Source: Amended at 6 Ill. Reg. _____, effective as noted in Section 700.106.

Section 725.194 - Recordkeeping and Reporting

a. The owner or operator must:

1. Keep records of the analyses required in Section 725.192(c) and (d), the associated groundwater surface elevations required in Section 725.192(e) reword to include (f) and (g) and the evaluations required in Section 725.193(b) throughout the active life of the facility and for disposal facilities, throughout the post-closure care period as well; and
2. Report the information required by Section 725.192(d), (e), (f) and (g) to the Director as follows:
 - A. Analytical results are to be submitted on forms provided by the Agency.
 - B. Results are to be submitted to the Agency by the 15th of January, April, July and October.
 - C. As part of the annual report, required under Section 725.175, the owner or operator must separately identify for each monitoring well any parameters whose concentration or value has been found to exceed the maximum contaminant levels listed in Appendix III.
 - D. The owner or operator must separately identify any significant differences from initial quality found in the wells, in accordance with Section 725.193(c)(1).
 - E. As part of the annual report required under Section 725.175: Results of the evaluation of groundwater surface elevations under Section 725.193(f) and a description of the response to the evaluation, where applicable.

b. If the contingency plan is implemented the owner or operator must:

1. Keep records of the analyses and evaluations specified in the plan, which satisfies the requirements of Section 725.193(d)(3) throughout the active life of the facility and, for disposal facilities, throughout the post-closure care period as well; and
2. Annually, until final closure of the facility and, for disposal facilities, throughout the post-closure care period as well submit to the Director a report containing the results of his groundwater quality assessment program which includes, but is not limited to, the calculated (or measured) rate of migration

of hazardous waste or hazardous waste constituents in the groundwater during the report period. This report must be submitted as part of the annual report required under Section 725.175.

Source: Amended at 6 Ill. Reg. _____, effective as noted in Section 700.106.

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APPENDIX II

Subpart: Groundwater Monitoring Requirements for Non-Hazardous Waste Facilities

Section I - Applicability

- a. The owner or operator of a Class II Landfill, Class III Landfill, surface impoundment, land treatment, or inground, onground, underground tank facility which is used to manage non-hazardous waste must implement a groundwater monitoring program which is minimally capable of determining the facility's impact on the quality of the groundwater underlying the facility.
- b. The owner or operator must develop, install, operate and maintain a groundwater monitoring system which meets the requirements of Section II and must comply with Sections III-V. The plan for this monitoring system must be submitted to the Agency for approval. This groundwater monitoring program must be carried out during the active life of the facility and for disposal facilities during the post-closure care period as well.
- c. All or part of the groundwater monitoring requirements of this subpart may be waived for construction and demolition type landfills if the owner or operator can demonstrate that there is a low potential for migration of waste constituents from the facility via groundwater to water supply wells (domestic, industrial, or agricultural) or to surface water. This demonstration must be in writing and must be submitted to the Agency for approval. This demonstration must be certified by a Certified Professional Geological Scientist (CPGS) or geotechnical engineer and must establish the following:
 1. The potential for migration of waste constituents from the facility to the groundwater by an evaluation of the unsaturated zone characteristics (i.e., geologic materials, physical properties and depth to groundwater); and
 2. The potential for waste constituents which enter the groundwater to migrate to a water supply well or surface water by an evaluation of:
 - A. Saturated zone characteristics (i.e., geologic materials, physical properties and rate of groundwater flow); and
 - B. The proximity of the facility to water supply wells or surface water.

Section II - Groundwater Monitoring System


- a. A groundwater monitoring system must be minimally capable of yielding groundwater samples for analysis and must consist of:

1. Monitoring wells (at least one) installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the waste management area. Their number, locations and depths must be sufficient to yield groundwater samples that are:
 - A. Representative of groundwater quality near the facility; and
 - B. Not affected by the facility;
2. Monitoring wells (at least three) installed hydraulically downgradient (i.e., in the direction of decreasing static head) within 10-25 feet of the liner or waste boundary. Their number, locations and depths must ensure that they immediately detect any statistically significant amounts of waste or waste constituents that migrate from the waste management area.
3. The Agency reserves the right to require the addition of additional monitoring devices at anytime.

- b. All monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. The casing material used must be such that it will not leach or adsorb contaminants to or from the water sample. (Any type of casing requiring cement type couplings is not permitted). This casing must have an inside diameter of not less than 2 inches and not more than 4 inches. The casing must be screened or perforated and packed with gravel or sand where necessary to enable sample collection at depths where groundwater flow zones exist. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed with a suitable material (e.g., cement grout or bentonite slurry) to prevent contamination of samples and the groundwater. The portion of the well casing, extending above the ground surface, must be protected so that it cannot be damaged or tampered with.

Section III - Sampling and Analysis

- a. The owner or operator must obtain and analyze samples from the installed groundwater monitoring system. The owner or operator must develop and follow a groundwater sampling and analysis plan. This plan must be submitted to the Agency for approval. The owner or operator must also keep this plan at the facility. The plan must include detailed procedures and techniques for:

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1. Sample collection - Procedure must be such that all samples collected are representative of the zone being monitored. Also, sample collection techniques must be such that cross contamination from one monitoring well to another or from one sample to another will not occur;
 2. Sample preservation and shipment;
 3. Analytical procedures; and
 4. Chain of custody control

Comment: See "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities", EPA-530 SW-611, August, 1977 and "Methods for Chemical Analysis of Water & Wastes", EPA-600/4-79-020, March 1979 for discussions of sampling and analysis procedures.

- b. The owner or operator must determine the concentration or value of the following parameters in groundwater samples in accordance with paragraphs (c) and (d) of this section:
 1. Parameters characterizing the suitability of the groundwater as a drinking water supply, as specified in Table I of the IPCB's Rules and Regulations on Public Water Supplies (Chapter 6).
 2. Parameters establishing groundwater quality:
 - A. Chloride
 - B. Phenols
 - C. Sodium
 - D. Sulfate
 3. Parameters used as indicators of groundwater contamination:
 - A. pH
 - B. Specific Conductance
 - C. Total Organic Carbon
 - D. Total Organic Halogen
 4. Any additional parameters deemed necessary by the Agency.

5. The schedule for sample collection is as follows:

Results Due in Accordance
with Section V(a)(2)(B)

Samples to be Collected
During the Month of

15th of January

December

15th of April

March

15th of July

June

15th of October

September

- c. 1. For each monitoring well, the owner or operator must establish initial concentrations or values of all parameters specified in paragraph (b) of this section. He must do this quarterly for one year. For each of the parameters specified in paragraph (b)(3), at least four replicate measurements must be obtained for each sample.
2. For each of the parameters specified in paragraph (b)(3), excluding pH, plus any additional parameters deemed necessary by the Agency, the initial background arithmetic mean and variance must be determined for each well by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained during the first year. For pH, a transformation to the hydrogen ion concentration in moles per liter of each replicate measurement must be completed prior to determining a geometric mean and variance for each well for samples obtained during the first year.
- d. After the first year, each monitoring point must be sampled quarterly (as specified in (b)(5) of this section) and the samples analyzed for:

Ammonia

NH₄

Boron

B

Chemical Oxygen Demand

COD

Chloride

Cl

Iron

Fe

Residue on Evaporation

ROE

Plus any additional parameters deemed necessary by the Agency

Samples collected during one of the quarters each year (as specified by the permit) must be analyzed, in addition to the above, for the parameters in (b)(3) and any additional parameters specified by the permit.

For each parameter specified in 725.192(b)(3), except pH, plus any additional parameters deemed necessary by the Agency, the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well and compare these results with its initial arithmetic mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases over initial quality. For pH, the owner or operator must calculate a transformation to the hydrogen ion concentration in moles per liter of each of four replicate measurements prior to determining the geometric mean and variance for each well and compare these results with the initial geometric mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 Level of significance to determine statistically significant increases or decreases over initial quality.

- e. Elevation of the groundwater surface at each monitoring well must be determined each time a sample is obtained. This determination is to be made prior to any water being withdrawn from the monitor well.
- f. The temperature of the groundwater sample is to be determined each time a sample is obtained.
- g. The depth to the bottom of the well, as measured from ground level, is to be determined each time a sample is obtained.

Section IV - Preparation, Evaluation and Response

- a. The owner or operator must prepare an outline of a groundwater quality assessment program. The outline must describe a groundwater monitoring program capable of determining:
 - 1. Whether waste or waste constituents have entered the groundwater;
 - 2. The rate and extent of migration of waste or waste constituents in the groundwater; and
 - 3. The concentrations of waste or waste constituents in the groundwater.

- b. For each parameter specified in 725.192(b)(3), except pH, plus any additional parameters deemed necessary by the Agency, the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well and compare these results with its initial arithmetic mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases over initial quality. For pH, the owner or operator must calculate a transformation to the hydrogen ion concentration in moles per liter of each of four replicate measurements prior to determining the geometric mean and variance for each well and compare these results with the initial geometric mean. The comparison must consider each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases or decreases over initial quality.
- c. 1. If the comparisons for the wells made under paragraph (b) of this section show a significant increase (or pH decrease) the owner or operator must submit this information in accordance with Section V (a)(2)(D).
2. If the comparisons for wells made under paragraph (b) of this section show a significant increase (or pH decrease) the owner or operator must then immediately obtain additional groundwater samples from those wells where a significant difference was detected, split the samples in two and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error.
- d. 1. If the analyses performed under paragraph (c)(2) of this section confirm the significant increase (or pH decrease) the owner or operator must provide written notice to the Director -- within seven days of the date of such confirmation -- that the facility may be affecting groundwater quality.
2. Within 15 days after the notification under paragraph (d)(1) of this section, the owner or operator must develop and submit to the Director a specific plan, based on the outline required under paragraph (a) of this section and certified by a Certified Professional Geological Scientist (CPGS) or geotechnical engineer for a groundwater quality assessment program at the facility.
3. The plan to be submitted under paragraph (d)(2) of this section must specify:
- A. The number, location and depth of wells;
 - B. Sampling and analytical methods for those wastes or waste constituents in the facility;

- C. Evaluation procedures, including any use of previously gathered groundwater quality information; and
- 4. The owner or operator must implement the groundwater quality assessment plan which satisfies the requirements of paragraph (d)(3) of this section and, at a minimum, determine:
 - A. The rate and extent of migration of the waste or waste constituents in the groundwater; and
 - B. The concentrations of the waste or waste constituents in the groundwater.
- 5. The owner or operator must make his first determination under paragraph (d)(4) of this section as soon as technically feasible and, within 15 days after that determination, submit to the Director a written report containing an assessment of the groundwater quality.
- 6. If the owner or operator determines (and the Agency concurs), based on the results of the first determination under paragraph (d)(4), that no waste or waste constituents from the facility have entered the groundwater, then he may reinstate the monitoring program described in Section III and paragraph (b) of this section. If the owner or operator reinstates the indicator evaluation program, he must so notify the Director in the report submitted under paragraph (d)(5) of this section.
- 7. If the owner or operator and/or the Agency determines, based on the first determination under paragraph (d)(4), that waste constituents from the facility have entered the groundwater, then he:
 - A. Must continue to make the determinations required under paragraph (d)(4) of this section on a quarterly basis; and
 - B. Immediately implement the facility's contingency plan as specified or any other, Agency approved, remedial plan.
- e. Notwithstanding any other provision of this subpart, any groundwater quality assessment to satisfy the requirements of Section IV (d)(4) which is initiated prior to the end of the post-closure period for the facility must be completed and reported in accordance with Section IV (d)(5).

- f. Unless the contingency plan is implemented, at least annually the owner or operator must evaluate the data on groundwater surface elevations obtained under Section III (e) to determine whether the requirements under Section II (a) for locating the monitoring wells continues to be satisfied. If the evaluation shows that Section II (a) is no longer satisfied, the owner or operator must immediately propose and obtain a permit from the Agency to modify the number, location or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement.

Section V - Recordkeeping and Reporting

- a. The owner or operator must:

1. Keep the records of the analyses required in Section III (c) and (d), the associated groundwater surface elevations, sample temperature, and well depth required in Section III (e), (f), and (g) and the evaluations required in Section IV (b) throughout the active life of the facility and for disposal facilities, throughout the post-closure care period as well; and
2. Report the information required by Section III (d), (e), (f) and (g) to the Director as follows:
 - A. Analytical results are to be submitted on forms provided by the Agency.
 - B. Quarterly results are to be submitted to the Agency by the 15th of January, April, July and October.
 - C. As part of the annual report, the owner or operator must separately identify for each monitoring well any parameters whose concentration or value has been found to exceed the maximum contaminant levels listed in Table I of the IPCB's Rules and Regulations on Public Water Supplies (Chapter 6).
 - D. The owner or operator must separately identify any significant differences from initial quality found in the wells, in accordance with Section IV (c) (1).
 - E. As part of the annual report: Results of the evaluation of groundwater surface elevations under Section IV (f) and a description of the response to the evaluation, where applicable.

- b. If the contingency plan is implemented the owner or operator must:

1. Keep records of the analyses and evaluations specified in the plan, which satisfies the requirements of Section IV (d)(3) throughout the active life of the facility and, for disposal facilities, throughout the post-closure care period as well; and

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Annually, until final closure of the facility and, for disposal facilities, throughout the post-closure care period as well, submit to the Director a report containing the results of his groundwater quality assessment program which includes, but is not limited to, the calculated (or measured) rate of migration of waste or waste constituents in the groundwater during the reporting period. This report must be submitted as part of the annual report.

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